

Claims

1. A process for preparing at least one olefin having from 8 to 12 carbon atoms from at least one olefin having from 4 to 6 carbon atoms by means of a four-stage synthesis, which comprises
 - 5 a) hydroformylating at least one starting olefin in the first process step,
 - b) hydrogenating the at least one aldehyde obtained in the first step a) to form the corresponding alcohol,
 - c) preparing at least one 1-olefin by elimination of water from the at least one alcohol obtained in the second process step b) and
 - 10 d) obtaining at least one olefin by metathesis with elimination of ethylene from the at least one 1-olefin(s) obtained in the third process step c).
2. The process as claimed in claim 1,
wherein a mixture of olefins having from 4 to 6 carbon atoms is used and a mixture of
15 olefins having from 8 to 12 carbon atoms is obtained.
3. The process as claimed in claim 1 or 2,
wherein a nickel, copper, copper/nickel, copper/chromium, copper/chromium/nickel,
zinc/chromium, nickel/molybdenum catalyst is used as catalyst in the second process
20 step b).
4. The process as claimed in at least one of claims 1 to 3,
wherein the elimination of water in the third process step c) is carried out continuously
over a solid catalyst which consists formally of aluminum oxide and barium oxide.
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5. The process as claimed in at least one of claims 1 to 4,
wherein a rhenium catalyst comprising Re_2O_7 on $\gamma\text{-Al}_2\text{O}_3$ or on mixed supports selected
from among $\text{SiO}_2/\text{Al}_2\text{O}_3$, $\text{B}_2\text{O}_3/\text{SiO}_2/\text{Al}_2\text{O}_3$ or $\text{Fe}_2\text{O}_3/\text{Al}_2\text{O}_3$ is used in the fourth process
step d).
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6. The process as claimed in at least one of claims 1 to 5,

wherein a hydrocarbon stream comprising or consisting of isobutene and linear butenes is used as starting material in process step a).

7. The process as claimed in at least one of claims 1 to 6,

5 wherein a C₄ fraction selected from among raffinate I, selectively hydrogenated C₄ fraction from a cracker, C₄ fractions from FCC plants or C₄-olefins prepared by the Fischer-Tropsch synthesis is used as starting material.

8. The process as claimed in at least one of claims 1 to 7,

10 wherein industrial C₄ fractions having an isobutene content of greater than 3% by weight are used as starting material.

9. The process as claimed in at least one of claims 6 to 8,

15 wherein 3-methyl-1-butene is separated off from the 1-olefin fraction comprising olefins having 5 carbon atoms which is obtained after the third process step c).

10. A mixture which comprises at least one olefin having from 8 to 12 carbon atoms and has been prepared by a process as claimed in any of claims 1 to 9.

20 11. Isooctene prepared by a process as claimed in any of claims 1 to 9 using a C₄ fraction having an isobutene content of greater than 3% by weight as starting material.

12. The use of a mixture as claimed in claim 10 or of isooctene as claimed in claim 11 for preparing alcohols and/or aldehydes.

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13. The use as claimed in claim 12 for preparing plasticizer alcohols.

14. The use as claimed in claim 12 for preparing isononanol.